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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/731,174

12/08/2003

Allen F. Podell

WTE 303

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7590

03/16/2005

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EXAMINER

TAKAOKA, DEAN O

ART UNIT

PAPER NUMBER

2817

DATE MAILED: 03/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/731,174

Applicant(s)

PODELL, ALLEN F.

Examiner

Dean O. Takaoka

Art Unit

2817

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,6-12,19,22,23,27,28,32-36 and 38-40 is/are rejected.
- 7) ☒ Claim(s) 3-5,13-18,24-26,29-31,37 and 41-43 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 12/8, 12/9, 1/6.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 6, 12, 19, 22 and 38 – 40 are rejected under 35 U.S.C. 102(b) as being anticipated by Mourant et al. (U.S. Patent No. 6,396,362).

Claims 1 and 38:

Mourant et al. (Figs. 7 – 9) shows a coupler (where the windings of the balun comprises coupling) comprising a dielectric substrate having first and second surfaces (insulative substrate between the first and second winding layers – not labeled in Fig. 8A; where any non-conductive material, e.g. insulative, would inherently comprise a dielectric constant); and at least a first coupler section including: a first spiral (P) including a first spiral portion on the first surface (1) and a second spiral portion on the second surface (2); and a second spiral (S) including a third spiral portion on the first surface (3) and a fourth spiral portion on the second surface (4); the first and second spirals being mutually inductively coupled (K).

Claim 2:

Where the first spiral includes input and output terminals on the first surface (1, 3) and the second spiral includes input and output terminals on the second surface (2, 4; shown in Fig. 8 with respect to Fig. 7).

Claim 6:

Where the portions of the first (1) and fourth (4) spiral portions are parallel and portions of the second (2) and third (3) spiral portions are in parallel (Fig. 8; where parallel sections are on different surfaces).

Claim 12:

Where the first (P) and second (S) spirals are mounted on the first and second surfaces of the dielectric substrate (shown in Fig. 8A where P and S are separated by the substrate).

Claims 19 and 39:

Further comprising an extension extending from and transverse to an intermediate portion of each of the first and second spirals (vertical coupling lines connecting first and second winding layers – Fig. 8), the extensions extending in a mutually non-overlapping relationship.

Claim 22:

Where the first and second spirals are substantially in opposing relationship relative to the dielectric substrate (Figs. 8 and 8A).

Claim 40:

Where the two extensions extend in opposite directions (where in the broadest interpretation, the vias are bi-directional, thus extend up and down).

Claims 1, 2, 6, 12, 19, 22, and 38 – 40 are rejected under 35 U.S.C. 102(b) as being anticipated by Kuettner et al. (U.S. Patent No. 5,852,866), prior art submitted in Applicant's IDS dated December 9, 2004.

Claims 1 and 38:

Kuettner et al. (Figs. 4, 5) shows a coupler (where the windings of the transformer comprises coupling) comprising a dielectric substrate having first and second surfaces (insulative substrate 4b between the first and second winding layers, shown in Fig. 2b; where any non-conductive material, e.g. insulative, would inherently comprise a dielectric constant); and at least a first coupler section including: a first spiral (right or left winding of 24/23) including a first spiral portion on the first surface and a second spiral portion on the second surface (Figs. 3 and 4); and a second spiral (other winding of 24/23) including a third spiral portion on the first surface and a fourth spiral portion on the second surface (Figs. 3 and 4); the first and second spirals being mutually inductively coupled (e.g. transformer; circuit shown in Fig. 5).

Claim 2:

Where the first spiral includes input and output terminals on the first surface and the second spiral includes input and output terminals on the second surface (where the double windings 24/23 of the transformer are bi-directional; where Fig. 5 shows an equivalent circuit for the primary and secondary where double winding 24/23 comprises input and outputs on both levels with respect to the equivalent circuit in Fig. 5).

Claim 6:

Where the portions of the first and fourth spiral portions are parallel and portions of the second and third spiral portions are in parallel (shown in Figs. 3 and 4).

Claim 12:

Where the first and second spirals are mounted on the first and second surfaces of the dielectric substrate (shown in Figs. 3 and 4).

Claims 19 and 39:

Further comprising an extension extending from and transverse to an intermediate portion of each of the first and second spirals (vertical coupling lines 25 connecting first and second winding layers – Figs. 3 and 4), the extensions extending in a mutually non-overlapping relationship.

Claim 22:

Where the first and second spirals are substantially in opposing relationship relative to the dielectric substrate (Figs. 2b, c).

Claim 40:

Where the two extensions extend in opposite directions (where in the broadest interpretation, the vias are bi-directional, thus extend up and down).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7 – 11, 23, 27, 28 and 32 – 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuttner et al. in view of Kusunoki (U.S. Patent No. 5,781,071).

Claim 23:

Kuttner et al. (Fig. 4) teaches the transformer, comprising a dielectric substrate having a first and second surface and a first coupler section including a first spiral including a first spiral portion on the first surface and a second spiral portion on the second surface; and a second spiral including a third spiral portion on the first surface and a fourth spiral portion on the second surface; the first and second spirals being mutually inductively coupled, discussed in the reasons for rejection of claim 1 above but is silent where the dielectric substrate is less than 10mils thick (claim 7) is less than 6 mils thick (claim 8) where the first and second spirals are N quarter wavelengths long (claim 9); where the design frequency is between 100MHz and 10GHz (claim 10); where the design frequency is greater than 1 GHz (claim 11); and a second coupler section including a first conductor mounted on the first surface of the dielectric substrate and connected to the first spiral and a second conductor mounted on the second surface of the dielectric substrate and connected to the second spiral (claim 23).

Kusunoki shows a similar spiral transformer (Fig. 1A and Fig. 13) comprising the limitations of claims 7 – 11 and 23 above.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the coupler disclosed by Kuttner et al. as a hybrid coupler disclosed by Kusunoki. Such a use would have realized the advantageous benefit of utilizing the transformer in a push pull amplifier arrangement (shown by

Kusunoki – Fig. 13), where the transformer of Kuttner et al. would have provided the further benefit of inexpensive manufacturing when using hard magnetic materials (col. 2, lines 8-28); where both Kuttner et al. and Kusunoki show layered spiral transformers using magnetic materials and semiconductor substrates (col. 3, lines Kuttner et al. and Kusunoki) thus suggesting the obviousness of the modification.

Claim 27:

Kuttner et al. (Fig. 4) teaches the transformer, comprising a first conductor having first and second ends and forming a spiral between the first and second ends and a second conductor having third and fourth ends and forming a spiral between the third and fourth ends, the first and second conductors being disposed on opposite surfaces of the substrate, the first and second spirals including a first spiral portion on a respective one of the first and second surfaces (where upper dual terminal 24 is connected to dual spiral line 21 and further connected by via 25 to lower dual spiral line 22 and dual terminal 23) and a second spiral portion on the respective other of the first and second surfaces, discussed in the reasons for rejection of claims above, but is silent with respect to the coupler transformer being a hybrid coupler.

Kusunoki shows a similar spiral transformer (Fig. 1A and Fig. 10) where the transformer is a hybrid (col. 2, lines 29 and 32).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the coupler disclosed by Kuttner et al. as a hybrid coupler disclosed by Kusunoki. Such a use would have realized the advantageous benefit of utilizing the transformer in a push pull amplifier arrangement (shown by



Kusunoki with respect to Fig. 3), where the transformer of Kuettner et al. would have provided the further benefit of inexpensive manufacturing when using hard magnetic materials (col. 2, lines 8-28); where both Kuttner et al. and Kusunoki show layered spiral transformers using magnetic materials and semiconductor substrates (col. 3, lines Kuttner et al. and Kusunoki) thus suggesting the obviousness of the modification.

Claim 28:

Where the first and second ends are on the first surface and the third and fourth ends are on the second surface (where Kuttner et al. shows dual ends 24 on the first surface and dual ends 23 on the second surface – Fig. 4 with respect to Fig. 2c).

Claims 32 and 33:

Where the dielectric substrate is less than 10mils thick (0.2um; col. 5, lines 32-35 – Kusunoki).

Claim 34:

Where the first and second spirals are N quarter wavelengths of a design frequency long (col. 5, line 59 to col. 6, line 10 – Kusunoki).

Claims 35 and 36:

Where the design frequency is between 100MHz and 10GHz; greater than 1GHz (i.e. several GHz – col. 5, line 64 – Kusunoki).

***Allowable Subject Matter***

Claims 3 – 5, 13 – 18, 20, 21, 24 – 26, 29 – 31, 37 and 41 – 43 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in

Art Unit: 2817

independent form including all of the limitations of the base claim and any intervening claims.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Zhao et al. shows a multi-level balun system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dean O. Takaoka whose telephone number is (571) 272-1772. The examiner can normally be reached on 8:30a - 5:00p Mon - Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Pascal can be reached on (571) 272-1769. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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March 3, 2005